P R O S P E C T U S

YEARBOOK OF AGRICULTURE 1953

PLANT DISEASES

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YEARBOOK OF AGRICULTURE 1953

The members of the 1953 Yearbook Committee are:

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NOTES FOR WRITERS

Nearly 300,000 copies of the Yearbook are printed. The book has an estimated million readers. No other current publication has the same number and type of readers nor offers so great an opportunity to a scientist to announce his findings and discuss his work. The importance of the publication demands the fulfillment of several obligations and professional standards -- in writing, attitude toward the assignment, promptness in submitting contributions and returning proofs, fairness to all persons and colleagues. The contributer should bear in mind that this is a cooperative venture of the Department of Agriculture, not of one bureau.

1. Our readers include: Farmers, city dwellers and others who have no prior interest in our subject, but whose interest might be attracted; high school students; businessmen, economists, teachers, Government officials, and others who need reference material; housewives; college students; gardeners; nurserymen; county agents; Congressmen; writers. Our aim is to provide useful, complete information and an authoritative reference work of lasting value.

2. Articles should reach Committee Members by December 1, 1951. (See Paragraph 17.) Authors should allow ample time before that for the customary bureau clearance and technical editing. The editor assumes that when a manuscript is submitted to him it is technically accurate and fully approved.

3. Length:

We do not specify the length of your article. A rough average would be 4,000 words, about 20 typed pages. Use the words you need to discuss the subject completely, clearly, and interestingly. No one needs to resort to terms like, "Space does not permit me to..." or "In this brief paper, room is lacking...." Space, however, is always at a premium; do not overwrite.

Make every word count. Do not waste space on a long introduction. Long sentences are not bad in themselves, but they often indicate redundancy. Avoid summaries that merely repeat earlier material. Organize your material; outline your article first; know beforehand what you are going to say; then say it. Get a logical train of thought and follow it. Rework your manuscript several times, asking yourself each time: Is this clear? Is it terse? If your outline is good, there is seldom a need to back-track (e.g., "as was pointed out in the foregoing paragraph"). Avoid verbosity in favor of the simple direct English (e.g., "soon" for "in the near future"; "we learned" for "on the basis of a series of experiments it was demonstrated that..."; "in summer" instead of "during the warm summer months," and many more). Try to avoid, as space wasters, passive verbs. Good paragraphing, so that one discusses only one clearly identified point at a time, saves words.

4. Material submitted for publication in the Yearbook should not be published or offered for publication elsewhere before it is printed in the Yearbook or definitely rejected by the editor.

5. The Yearbook Committee plans the scope, content, and structure of the volume and advises the editor on problems of technical accuracy, suitability, and completeness. Problems of writing, presentation, duplication, illustration, and such are handled directly by author and editor after an article is submitted, not through a Committee Member of bureau official, although the editor usually keeps them informed of such details. There must always be the possibility of direct exchange between author and editor. Proofs particularly must be returned directly and expeditiously.

6. Contributors and other interested persons are invited to submit to Committee Members suggestions for papers not listed in this Prospectus, which is not offered as a final, static document. We want our book to be up-to-date, fresh, and living -- and different, not a rehash of old material.

7. Because the actual printing takes at least 6 months and the editing up to 6 months more, as much as a year elapses between the writing of an article and the appearance of the Yearbook. Authors, therefore, should follow through on their manuscripts and be sure that in each of its steps it remains accurate and up-to-date as of that particular date.

8. This Prospectus is not a secret or restricted document, but a great deal of effort is saved if each person to whom it is sent will remember that it is for his own use only and not for wide discussion or announcement.

9. Entries in this outline are topics, not necessarily the titles of the articles. Titles that authors use on their manuscripts should be short, accurate, and attractive. Changes may be made in them to conform to typographic style yet to be chosen.

10. Subheads will follow the practice of the 1949 and 1950-1951 Yearbooks.

11. Avoid phrases like "last year," "recently," "a few years ago." Be specific as to year; remember this volume will appear in 1953, but will be in circulation much longer than that. Consequently a term like "this spring" is meaningless.

12. Avoid footnotes.

13. Publications may be mentioned in the text with full name of author and the work. We do not cite literature by numbers in parentheses in the text. For bibliography, authors may submit (on separate sheets) a list of major contributions bearing on his topic; these should give titles, authors, and other data accurately and without abbreviations.

14. Charts and line drawings are welcome. We shall try to get along without tables. Contributors are invited to submit color and black-and-white photographs, although we shall not know until the appropriation bill is passed in 1952 whether we can use them. (The same contingency applies to all our plans, of course.) Do not send negatives of black-and-white photographs. Pack and label the pictures carefully. All precautions are taken, but the editor assumes limited responsibility for the return of photographs.

15. Author's note -- Instead of identifying the author in a footnote on the first page, we plan to continue the practice of printing at the end of the article the author's name, position, and affiliation, with details of his professional career and experience.

16. The Style Manual of the Government Printing Office governs capitalization, compounding, spelling, abbreviations, numerals, punctuation, and syllabication.

17. The original and the first carbon copy should be sent to to the respective Committee Member as below or to the Chairman of the Committee; they will send the manuscripts to the editor after reading the whole section.

Parts 6-21.

Rodenhiser
- Cereals
- Forage
- Cotton
- Seed Treatment (Part 3)

Clayton
- Tobacco
- Special
- Rubber
- Sugar
- Soil Treatment (Part 3)

Wheeler
- Quarantines
- Introduced
- Disease Control Programs
- Eradication (Part 3)

Zaumeyer
- Vegetables
- Potatoes
- Transportation Diseases
- Resistance (Part 3)

McClellan
- Fruits
- Fungicides
- Ornamentals
- Spraying and Dusting (Part 3)

Miller
- Disease Distribution
- Forecasting
- Crop Losses
- Nematodes

Lefebvre
- Experiment Station - Liaison
- Seed and Plant Certification (Part 3)

18. All material should be double spaced; single spacing is not permitted anywhere.

19. Do not run a paragraph over from one page to the next; they cannot be sent that way to the printer. That does not mean one paragraph to a page -- several paragraphs may be put on the same page so long as the last one does not run over.

20. Margins should be set so that lines average 66 characters and spaces.

21. We try to make charts and tables self-contained and avoid the often unnecessary "(see Fig. 3)" in the text.

22. We avoid saying in the text, "Brown's findings were..." or "Smith and Jones disproved the theory...." Instead, we gain accuracy and completeness by a phrase like "Lyle P. Brown, in experiments at the Alabama Agricultural Experiment Station, found that ...."

23. Reprints can be obtained, as usual. Details of obtaining reprints are not handled by the editor of the Yearbook; consult your division of information regarding reprints or (if you are not in USDA) the Superintendent of Documents when the Yearbook is in print.

24. The following notes on writing are excerpts from a booklet The Publication of Research, issued by the Agricultural Research Administration in January 1945; the booklet reproduces a talk by the late Dr. E. W. Allen, who was Chief of the Office of Experiment Stations from 1915 to 1929:

The purpose of writing is not only to express ideas, but to communicate them to others. Science is not inherently dull, heavy, and hard to comprehend; it is essentially fascinating, understandable, and full of charm. It is simple, after it has been worked out, and is capable of being stated in concise terms easily understood.

But to succeed in conveying ideas correctly and in a readable way requires considerable effort on the part of most of us. It calls for time to do it well. It is just as important as making more experiments, although the worker may not like it as well, and it is quite as worthy of his best effort.

The aim in publishing research, as well as in carrying it on, is to leave the field clearer than you found it. If that cannot be done it is doubtful whether a scientific paper is justified. There cannot be clear writing without clear thinking, and when one learns to write clearly, he will in the process learn to think clearly. Indeed it may be doubted whether thought and its expression can be separated.

Clearness is absolutely essential in technical writing. It is not enough to use language that may be understood -- it is necessary to use language that cannot be misunderstood.

Having something to say, therefore, say it in your own way, provided you use good diction, the right word, and a simple form of expression.

Remember the reader. Be sympathetic toward him. He must make some effort, but he is not bound to follow you through. The writer has not the same hold on his audience that the speaker has.

Brevity is another important quality of a technical paper. This does not mean that the presentation should not be adequate to a clear understanding of what is reported and ability of the reader to judge the merits of the contribution; but the length should be proportionate to the actual contribution. Nowhere are more skill and judgment required.

The question of what to leave out will be one for very careful consideration, which frequently cannot be settled at the first writing. On review it may be found that considerable may be left out without sacrificing anything really essential. Descriptions and statements of facts gain force by brevity and by sticking quite closely to the real kernel of the subject.

As a rule, the more definitely a fact has been established by an investigation, the more directly and simply it can be presented. It is the doubtful ones that have to be hedged about with explanations, qualifications, and cautions.

The style of the technical paper should be simple, straightforward, and dignified. It should suggest neither a fairy tale, a sensational newspaper story, nor a sermon, but rather a simple, unaffected, and uncolored account of work done and its application. Accuracy and clearness ought never to be sacrificed to a supposedly more popular style. The presentation should be such as to win the reader's confidence in the thoroughness and reliability of the work reported.

CONDENSED OUTLINE

1. Causes of Plant Diseases
2. Plant Diseases and Human Welfare
3. Methods of Control
4. The Regulatory Activities in Control Programs for the Department
5. Plant Diseases and the Foreign Agricultural Technical Aid Program
6. Diseases of Forage Crops
7. Diseases of Cotton
8. Diseases of Wheat, Oats, Barley, and Rye
9. Diseases of Corn and Sorghum (and Flax?)
10. Diseases of Vegetable Crops
11. Diseases of Sugar Cane and Sorghum
12. Diseases of Sugar Beets
13. Diseases of the Hevea Rubber Plant
14. Diseases of Special Crops
15. Diseases of the Tobacco Plant
16. Diseases of Ornamentals
17. Diseases of Fruits and Vegetables in Transit, in Storage, and on the Market
18. Diseases of Tree Fruits
19. Diseases of Small Fruits
20. Diseases of Tropical and Subtropical Fruits
21. Diseases of Forest and Shade Trees

Part 1. The Causes of Plant Disease

1. The Fungi as Causes of Plant Disease. (C. M. Tucker)

This chapter will present information on the nature of fungi, the relationship between host and parasite, infection, incubation period, the relation of symptoms to fungus action, proof of parasitism, examples of simple and complex life cycles of fungi in relation to disease, including overwintering, alternate hosts, etc. Specific diseases will be used as examples. Drawings of life cycles.

2. Variability in Plant Pathogenic Fungi. (E. C. Stakman)

3. How Fungi are Identified. (John Stevenson)

Identifying a fungus involves naming it properly, thereby providing a key to available knowledge concerning it. Methods followed include a use of isolation, pure culture, and inoculation techniques, the preparation of mounts for microscopic study, comparative studies with authentically named herbarium material, and the use of catalogs, keys, the literature, and other sources of mycological information. For certainty of reference and a basis for research it is necessary to know the fungus or fungi involved in any situation that arises. This involves classification systems, which have had a varied history from Micheli to Martin. The present usable system can be briefly outlined with keys to major groups (and illustrations if desired) with important plant parasites of each very briefly discussed in general terms. Should include also how fungi are named and the International Rules of Botanical nomenclature as they affect fungus naming.

4. Importance of Fungus Collections to Control Plant Diseases. (W. W. Diehl and John Stevenson)

A collection (herbarium) of fungi, with emphasis on plant disease specimens in an agricultural research institution, serves various purposes. Such a collection is necessary for identification work and as a basis for comparative and monographic studies of the fungi and may serve also for teaching and general educational purposes. It is the place of deposit for plant disease materials worked over critically by specialists. Methods of building such collections involve proper collecting and preserving of specimens and their labeling, mounting, insertion and cataloging, as well as preparation and maintenance of collateral collections of microscopic mounts, pertinent literature, photographs, and related materials. The importance of type culture collections will be brought out.

5. How to Collect and Preserve Fungi. (John Stevenson and Edith K. Cash)

To best serve the purposes cited in chapter 4, fungi must be properly collected and preserved. The standard techniques that have been developed for both will be outlined so as to correlate the subject into related topics.

6. Bacteria as Causes of Plant Disease. (W. H. Burkholder)

A companion chapter to the one on fungi as cause of disease. Included will be a statement on classification of bacteria and the need for laboratory facilities.

7. Viruses as Causes of Plant Disease. (C. W. Bennett)

Properties, identification, structure, survival, distribution, size, reproduction, transmission. This discussion will cover the more technical aspects of plant virus research without necessarily relating the discussion to specific diseases except as they would be used to illustrate principles. It will bring together the latest advances in virus technology and virus disease control. The advances made possible by the electron microscope should be explained. The types of virus diseases will be described and differences in behavior discussed. The classification of viruses can be included, but it should be explained that no system has general acceptance.

8. Nematodes as Causes of Plant Diseases. (A. L. Taylor and others)

A full discussion of one or two representative species of each group, including a description, life history, biology, symptoms, and hosts. The economic importance of the species will determine the length of each. There will be shorter discussions of related species of similar habits.

Control of nematodes will be discussed in a separate section with the subheadings: General principles, control in soil, and control in plants.

9. Nonparasitic Diseases.

Gas and chemical injury, cold, heat, drought, sunscald, smog, soil deficiencies as causes of plant disease. The relation of mineral to abnormal plant growth will be explained. Essential as well as trace element relationships will be developed. Examples will be given of deficiency diseases and how to control them and of diseases caused by mineral excesses. Methods of diagnosing diseases caused by an excess or deficiency of minerals will be explained. Illustrations will be included.

10. Weather Damage.

11. Parasitic Seed Plants as Causes of Plant Disease: Mistletoe, Dodder, etc. (Lake Gill)

12. Relation of Weather to the Development of Plant Diseases. (P. R. Miller)

The role of weather in the ever-changing seasonal development of important plant diseases will be discussed with a view to pointing out (a) effect on survival and increase of pathogens; (b) on the abundance or lack of vectors in certain cases; (c) importance of proper timing of spray applications; (d) conditions which favor severe outbreaks of certain specific diseases; (e) behavior of diseases under unusual weather conditions, ex. blue mold. The geographical distribution of some of the more important plant diseases will be discussed and illustrated with respect to their relation to weather, and the operation and results of the Plant Disease Warning Service, which is an outgrowth of these epidemiological studies, will be described.

13. Relation of Insects to the Spread of Fungus and Bacterial Diseases.

14. Relation of Insects to the Spread of Virus Diseases. (L. M. Black)

Part 2. Plant Diseases and Human Welfare

15. The Importance of Plant Disease. (Jessie Wood)

Reasons why plant diseases are important to everybody will be explained. The history of plant disease epidemics that have had profound consequences in the lives of peoples will be reviewed. The part taken by plant diseases in determining the agricultural development of a region and the effect of losses from plant diseases on farm life will be investigated. Factors involved in importance of diseases will be analyzed, together with reasons for and effects of changing importance.

Part 3. Methods of Plant Disease Control; Spraying and Dusting

16. The History, Development, and Use of Fungicides for Spraying and Dusting. (J. Dunegan and M. C. Goldsworthy)

Starting with a definition of a fungicide, the early use of various materials for protection against blights and plagues will be related, followed by a discussion of the discovery of bordeaux mixture and lime sulfur solution. The effect of the introduction of these materials on agricultural procedures will be described, followed by an appraisal of their defects. Screening procedures for the discovery of new compounds will be described and an account will be given of the various organic materials presently in use. The accompanying evolution of spray machinery will be described and the benefits already derived from the use of new materials and improved equipment will be discussed from the standpoint of reduced phytotoxicity, increased efficiency in disease control and conservation of essential materials. The discussion will include comments on the world-wide use of fungicides. List of fungicides and their chemical composition.

17. Control of Diseases of Seeds, Bulbs, and Tubers. (R. W. Leukel)

This subject will deal with the different classifications of treatments, such as disinfestants, disinfectants or protectants, based on the location of the fungi to be combatted; organic or inorganic, metallic or nonmetallic, mercurial or nonmercurial, based on the composition of the fungicides; and dust, slurry, liquid or gas, based on the form in which they are applied. Specific recommendations will be made with regard to the materials that have been found satisfactory for seeds of cereals, forage crops, fiber crops, sugar beets, vegetables and other crops. Methods of treating and precautions to be used when treating seed will be discussed. Other phases will include the results obtained from the combination of fungicides and insecticides with resulting synergism or antagonism, the use of hormones in seed treatments, and the effect of storage on treated seed.

18. Growing Disease-Free Seed. (E. L. LeClerg)

Mention will be made of the use of resistant varieties, general methods of disinfecting seed that may produce disease-free plants which in turn would yield disease-free seed. The growing of various crops in dry climates for the production of disease-free seed should be expanded -- beans, peas, watermelon, squash, and other cucurbits. The extensive development and production of foundation and certified seed for various crops should be discussed. Tuber indexing and the growing and testing of these potato tubers in Florida and Texas during the winter months will be discussed.

19. Growing and Distributing Disease-Free Plant Stocks.
(L. C. Cochran and F. M. Blodgett)

The research and other work in progress at certain colleges and universities on developing and producing virus-free rootstocks, budwood and seedlings of stone fruits and other plants. General indexing program should be discussed.

20. Soil Treatments for Disease Control in Hawaii. (Walter P. Carter)

Article by Carter (Hawaii) discussing the use of the new fumigation treatments in Hawaii.

21. Soil Treatments for Vegetable Crop Disease Control.
(Jessie I. Christie)

22. Disease Resistance in Plants. (G. H. Coons)

Disease control through the development of resistant varieties. Summarize the early work on the breeding of disease resistant varities. Bring out the increasing degree to which plant disease control is being based on disease resistance. Indicate some of the outstanding achievements and some of the problems that have arisen, such as physiologic races. Discuss the value of high-level resistance and immunity, as opposed to tolerance. (Tomato wilt is one example). Discuss methods of crossing that are being used with different crops. Also methods that are being used for testing progenies and advanced lines for resistance, yield, and quality. What is the usual time required to produce a disease-resistant variety? How are new resistant varieties made available to the farmer?

23. Origin and Inheritance of Disease Resistance in Plants.
(F. J. Stevenson and Henry A. Jones)

The sources from which disease-resistance genes have been obtained, covering all the more important crops. While varieties may change, the same disease-resistance genes are used over and over. Possible new sources of disease resistance. The genetics of disease resistance. Simple or complex inheritance may facilitate or retard a breeding program. Other related genetic problems, such as linkage. Problems involved in the utilization of disease resistance found in the wild species and how the problem of interspecific crossing is being solved.

24. Growth Processes and Plant Structures That Modify Disease Resistance in Plants. (S. A. Wingard)

The relation of definite anatomical structures or chemical entities to the expression of disease resistance. Kinds of resistance, such as hypersensitivity. Factors influencing the expression of resistance, such as age of plants.

25. The Relation of Soil Nutrients to Disease Development. (George L. McNew)

Quarantines and the Prevention of Plant Disease Distribution

26. Dangerous Plant Diseases Introduced from Foreign Countries. (C. R. Orton and G. F. Gravatt)

A discussion of the many means by which diseases can be transported. Things to be covered include nursery stock, fruit, seeds, plant products, insects. In this paper reference should probably be made to certain of our most important plant disease introductions such as white pine blister rust, chestnut blight, Dutch elm disease, potato wart, citrus canker, black stem rust, quick decline of citrus, and large canker. Brief mention might be made of the attempts to eradicate such diseases, with a report on the success or lack of success in the eradicatory efforts.

27. Dangerous Plant Diseases Not Yet Known to Occur in the United States.

A discussion of diseases which have not arrived here; known to be serious in foreign lands. This paper should also cover the need for foreign surveys, foreign testing of our plants, and any other means of determining the potential danger of pathogens not yet established in this country.

28. Plant Disease Inspection of Foreign Plant Importations and the Difficulties Involved. (D. P. Limber and P. R. Frink)

Information on the work of the Division of Foreign Plant Quarantines, and some of the difficulties involved in protecting this country from the introduction of new diseases.

29. Foreign and Domestic Plant Quarantines for the Prevention of Plant Disease Introduction and Spread. (H. S. Dean)

This will include a review of the Plant Quarantine Act of 1912, together with a discussion of the purposes of the quarantines promulgated under that Act.

Part 4. The Regulatory Activities in Plant Disease Control Programs of the Department of Agriculture

30. The Eradication Program Against Citrus Canker. (R. N. Dopson, Jr.)

A history of the effort from its beginning, and a statement on the final result.

31. The Control Program Against Phony Peach and Peach Mosaic Diseases. (E. Cavanaugh and C. H. Rothe)

The program of control and the possible vectors concerned.

32. The Control Program Against White Pine Blister Rust. (J. F. Martin)

Ribes eradication and the efforts to prevent the growing of susceptible ribes in eradication areas.

33. The Barberry Eradication Program. (L. K. Wright)

The part played by barberry eradication in the control of stem rust.

34. The Eradication Program Against Potato Wart. (L. C. Hartman)

The fight through the years to eradicate this disease in Maryland, West Virginia, and Pennsylvania; and a report on its probable success.

35. The Control and Survey Program for the Golden Nematode. (H. L. Smith)

A brief account of the history of the potato pest in Europe, its introduction into Long Island, New York, the efforts being made to prevent its spread, and the surveys being conducted in other States to find new infestations. Symptoms of the trouble caused by the pest should be given and a photograph would be valuable, so persons connected with agriculture in the United States will be watching for it in new areas.

Part 5. Plant Diseases and the Foreign Agricultural Technical Aid Program

36. Cinchona: root diseases, leaf diseases; Cacao: Phytophthora pod rot, Monilia pod rot, Witches' Broom, virus disease; Coffee: root diseases, leaf diseases. (A. G. Kevorkian)

Discussion of symptoms, damage, and control.

Part 6. Diseases of Forage Crops

37. Diseases of Clover. (Earle Hanson and K. W. Kreitlow)

38. Diseases of Alfalfa. (Oliver Smith and F. R. Jones)

39. Diseases of Southern Legumes. (J. L. Weimer and J. L. Allison)

40. Diseases of Soybeans. (Howard Johnson and Don Chamberlain)

41. Rusts and Smuts of Grasses. (George M. Fischer)

42. Root and Crown Rots of Grasses. (Roderick Sprague)

43. Foliar Diseases of Grasses. (John Hardison, K. W. Kreitlow, and H. Johnson)

44. Turf Diseases. (C. L. Lefebvre)

45. Seed-borne Diseases of Grasses and Legumes. (John Hardison)

Part 7. Diseases of Cotton

46. Fusarium Wilt and the Nematode Complex. (A. L. Smith)

47. Cotton Root Rot. (Lester M. Blank)

48. Verticillium Wilt of Cotton. (J. T. Presley)

49. Anthracnose and the Blight Diseases of Cotton. (A. L. Smith)

50. Seedling Diseases and Soreshin. (D. C. Neal)

51. Boll Rots of Cotton. (Paul Marsh)

52. Cotton Rust and Internal Collar Rot. (J. T. Presley)

53. Leaf Spots of Cotton. (Lester M. Blank)

54. Nonparasitic Diseases of Cotton. (W. H. Tharp)

a. Potash hunger
b. Crazy top
c. Manganese toxicity
d. 2,4-D injury

Part 8. Diseases of Wheat, Oats, Barley, and Rye

55. Rusts of Wheat, Oats, Barley, and Rye. (H. A. Rodenhiser)

Brief paragraph on the world importance of stem and leaf rusts of these cereals followed by a description of comparative life histories of the two rusts, distinguishing characteristics, physiologic specialization, and the relationship of races to the problem of breeding for resistance.

56. Smuts of Cereal Crops. (C. S. Holton and V. F. Tapke)

Cereal statements as to the economic importance of the diseases. Brief presentations of distinguishing characteristics and the life histories of the seedling, vrs. floral infecting smuts with relation to control methods. Discussion of the role of physiologic races and progress being made in breeding for smut resistance.

57. Seedling Blight and Foot Rots of Cereals. (J. J. Christensen)

Brief discussion of the losses, symptoms, environmental and cultural practices affecting their development. Discussion of the benefits derived from seed treatment of diseased and healthy seed stocks.

58. Leaf and Head Blights of Cereals. (J. G. Dickson)

Discussion of the importance of the diseases, symptoms, methods of control, and sources of resistance.

59. Powdery Mildews of Small Grains and Grasses. (V. F. Tapke and C. V. Lowther)

Brief discussion of the losses caused by the diseases; the development of epidemics with relation to the occurrence of new races of the pathogen and breeding for resistance.

60. Virus Diseases of Cereals. (H. H. McKinney)

General statement regarding the nature of virus diseases of cereals, their economic importance, and symptoms. Brief discussion of the different viruses that attack cereals, the method of transmission through soil, seed, and by insect vectors and the progress made in control of these virus diseases.

Part 9. Diseases of Corn, Grain Sorghum, and Flax

Corn
Including Sweet Corn

61. Corn Seedling, Stalk, and Foot Rots. (Paul Hoppe)

62. Corn Ear Rots. (Arnold J. Ullstrup)

63. Corn Leaf Blights. (A. L. Robert)

a. Helminthosporium turcicum
b. Helminthosporium carbonum
c. Helminthosporium maydis
d. Bacterial wilt

64. Corn Smuts and Rust. (Arnold J. Ullstrup)

65. Grain Sorghum Diseases. (R. W. Leukel and J. H. Martin)

a. Seed rots and seedling blights
b. Leaf diseases
c. Smuts
d. Root rots
e. Stalk rots

The above topics to be presented in one paper with discussion on losses, symptoms, and methods of control.

66. Flax Diseases. (H. H. Flor)

1. Rust and wilt
   Brief paragraph on the importance of these diseases followed by discussion on the life history, and the role of physiologic specialization with relation to breeding for disease resistance.

2. Fasmo and miscellaneous diseases of flax

Part 10. Diseases of Vegetable Crops .

Under each disease heading discussion will include description of the more serious diseases affecting the different crops with mention of the causal agents, methods of overwintering and dissemination, relation of environment to disease development and spread, and control measures.

67. Diseases of Bean and Lima Bean. (V. J. Zaumeyer and H. Rex Thomas)

A discussion of the important diseases of these crops such as bacterial blights, viruses, including curly top, rust, anthracnose root rots, and sclerotinia of bean, downymildew and stem anthracnose of lima bean.

68. Diseases of Peas. (W. T. Schroeder)

Ascochyta blight, root rots, wilt, and bacterial blight of pea.

69. Diseases of Celery. (A. C. Foster)

The diseases of economic important of this crop to be presented are: Late and early blight, phoma root rot, pink root, and black heart.

70. Diseases of Cucurbits. (John T. Middleton and G. W. Bohn)

The diseases to be discussed are downy mildew, bacterial wilt, mosaic, anthracnose, and powdery mildew of cucumber and melon, and fusarium wilt and anthracnose of watermelon.

71. The Important Diseases of Lettuce. (G. W. Bohn)

Drop, bottom rot, and downy mildew of lettuce will be discussed.

72. The Diseases of Cabbage, Cauliflower, and Related Crops.

The discussion will deal primarily with cabbage yellows, club-root, black rot, and blackleg.

73. The Diseases of Onion. (J. C. Walker)

The important diseases of this crop that will be dealt with are smut, downy mildew, and neck rot.

74. The Diseases of Potato. (E. S. Schultz)

A discussion of the most common diseases such as the virus diseases, including A, X, Y, leafroll, net necrosis and yellow dwarf, late blight, scab, bacterial brown rot, ring rot, and verticillium wilt.

75. The Diseases of Sweetpotato. (Harold T. Cook)

The diseases dealt with in this article will be stem rot, black rot, foot rot, and scurf.

76. Peanut Diseases. (Coyt Wilson)

77. Tomato Diseases. (S. P. Doolittle)

The following diseases will be discussed: Fusarium wilt, late blight, early blight, virus diseases, septoria blight, bacterial canker, leaf mold, anthracnose, and blossom-end rot.

78. Pepper, Spinach, Carrot, and Beet Diseases. (A. G. Newhall)

79. Control of Diseases in Seedling Tomato Plants Grown in the South for Shipment to the North. (H. I. Borders)

Disease-free tomato plants are vital both to the southern plant grower and to the producer of canning crops in the North. In Georgia, where the majority of field-grown seedlings are produced, State authorities inspect and certify plants as to freedom from certain diseases such as late blight, alternaria stem canker and leaf spot, bacterial wilt, and root-knot. Therefore, successful production of certified plants requires almost perfect disease control and the problem is more difficult than with bearing crops where good yields can be had even though some disease is present.

80. Breeding Disease-Resistant Vegetable Crops. (H. R. Thomas and W. Zaumeyer)

A review of the breeding work for disease resistance in vegetables, including bean, pea, tomato, potato, cabbage, lettuce, melon, and watermelon, etc.

81. Mushroom Diseases. (E. B. Lambert and T. T. Ayres)

Part 11. Diseases of Sugar Cane and Sorghum

82. Sugar Cane and Its Diseases. (E. V. Abbott)

An introductory article on the areas of sugar cane culture and the significance of fungus, bacterial, and virus diseases attacking sugar cane in the United States and abroad. Leaf, stalk, and root diseases will be discussed with photographs. Distributional maps for serious diseases not yet known in U.S.A. will be given.

83. Sugar Cane Mosaic. (E. W. Brandes)

Information about this serious disease and the dramatic story of its control by introduction of resistant varieties will be given. Essentially Technical Bulletin 995 will be epitomized, with new information as available added.

84. Red Rot of Sugar Cane. (E. V. Abbott)

Information about this serious disease and its control will be discussed. Recent developments on etiology of the disease, its distribution, and control.

85. Disease Resistance Breeding and Evaluation of Resistant Sugar Cane Varieties. (George Arceneaux, C. O. Grassl, and E. V. Abbott)

Methodology of developing varieties resistant to mosaic and red rot, with illustrative information on its application. The steps in evaluating the seedling varieties that pass the initial screening tests, and the final agronomic evaluation technique will be described.

86. Diseases of Sorgo. (E. V. Abbott, Paul E. Bouchereau)

Diseases likely to become serious with intensified culture of sorgo. The important diseases and what has been discovered as to control.

Part 12. Diseases of Sugar Beets

87. Sugar Beet Diseases and Their Control. (G. H. Coons)

An introductory article on sugar beet culture in the various States and the limiting effects that sugar beet diseases have had on crop production. The fungus, bacterial, and virus diseases will be enumerated, both for U.S.A. and abroad. The write-up will be more than a mere catalog of diseases, since descriptions and photographs will seek to be definitive for the important diseases, and a brief statement of control measures will be given as applicable. (Guard against duplicating material in succeeding chapters.)

88. Sugar Beet Curly Top Virus Research. (C. W. Bennett, N. J. Giddings, J. M. Fife, and C. F. Lackey)

This article on a serious virus disease of sugar beets will deal with the discoveries concerned with the curly top virus, and host reaction, and its transmission.

89. Breeding Sugar Beets for Resistance to Curly Top, Rust, and Downy Mildew. (F. V. Owen, J. S. McFarlane, Charles Price, and A. M. Murphy)

Breeding resistant varieties, particularly combining resistance to several diseases in one variety and the methods whereby this is accomplished.

90. Breeding Sugar Beet Varieties Resistant to Leaf Spot and Black Root. (G. H. Coons, Dewey Stewart, J. O. Gaskill, H. W. Bockstahler, G. J. Hogaboam, and C. L. Schneider)

Method of disease control applicable to midwest and eastern sugar beet growing districts subject to both leaf spot and black root. It will be essentially an article describing methods of incorporating black root resistance into varieties already bred for leaf spot resistance.

Part 13. Diseases of the Hevea Rubber Plant

91. Breeding Hevea Rubber Trees for Leaf Blight Resistance. (R. D. Rands)

History, symptoms and control measures.

Part 14. Diseases of Special Crops

92. Diseases of Special Crops -- Mint, Henbane, Digitalis, Castor Bean, etc. (C. A. Thomas)

The importance of the diseases of this group of crops as a unit. Factors involved in the introduction of new disease organisms, distribution of organisms, severity of diseases, and most suitable control methods as related particularly to this group of crops. This to be followed by a discussion of diseases of certain representative crops such as castor beans, mint, digitalis, safflower, henbane, etc.

Part 15. Diseases of the Tobacco Plant

93. Diseases of Tobacco. (E. E. Clayton)

A discussion of all the diseases of tobacco that are of economic importance, black root rot, nematode root rot, root knot, bacterial wilt, fusarium wilt, black shank, stem rot, soreshin, blue mold, wildfire, mosaic, etc. The distribution and importance of the diseases in different areas, the methods of spread and influence of weather conditions, and the methods of control will all be covered.

94. Control of Tobacco Diseases through Resistance. (E. E. Clayton)

The development of work on disease resistance will be outlined from the beginning and the evolution of important varieties will be traced. The various sources of disease resistance genes will be discussed and the present breeding program under way in this country will be covered in some detail. In conclusion will be a brief preview of what may be expected in the near future.

95. Crop Rotation for the Control of Soil-borne Diseases of Flue-cured Tobacco. (J. G. Gaines and F. A. Todd)

The discussion will be based on the extensive work conducted at Tifton, Georgia, since 1925. A second center of information will be the work at McCullers, North Carolina, which has now been in progress for 15 years. The importance of crop rotation in holding diseases in check, and also in relation to yield and quality, will be discussed. Disease resistance is not a substitute for rotation -- the two are complementary.

96. Soil Treatments in Plant Bed and Field for Tobacco Root Diseases. (J. G. Gaines and T. W. Graham)

The situation with respect to the soil fumigation field treatments. Application, equipment, procedures, disease control, and effects on yield and quality will all be discussed. The plant bed chemical soil treatments will be discussed primarily with reference to disease control, particularly control of nematode root knot.

Part 16. Diseases of Ornamentals

97. Rust and Anthracnose of Snapdragon. (W. D. McClellan)

This disease was first found in California in 1895. Its spread can easily be traced to other centers in California, to the midwest, to the East, and finally to Europe and Africa. The development of resistance followed by the discovery of another strain. Its control by fungicides. Apparent control in the East with Bioquin 1 is due to control of secondary organisms and not the rust. This material ineffective in West where rust is serious and secondaries are not.

98. Aster Wilt. (K. F. Baker)

This disease is very interesting both because of its importance and the apparent existence of numerous strains of Fusarium. Paul Tilford's resistance program and also commercial programs of breeding for resistance. Symptoms.

99. Azalea Flower Spot. (D. L. Gill)

How a new disease suddenly became a serious menace to the flowers in southern gardens. How the disease was investigated. Cooperation between pathologists and entomologists in determining its spread by insects. The life history of the disease. How the disease can be controlled -- ground treatments for inhibiting apothecial development and spray applications on the flowers to control the blight with dithiocarbamates.

100. Fungus and Bacterial Diseases of Carnations.
(E. F. Guba and Ralph W. Ames)

a. Alternaria leafspot and branch rot -- discuss effect of outside culture vs. inside culture on severity of this disease. Symptoms and control.

b. Wilt diseases -- Fusarium and bacterial. Compare symptoms of the two wilts and their control.

c. Cultured carnations -- now being tried commercially because of success in chrysanthemum production. Methods, prospects of success, limitations.

101. Foliage and Wilt Diseases of Chrysanthemums. (A. W. Dimock)

a. Septoria leaf spot -- Serious disease of chrysanthemums grown out-of-doors. Symptoms, life history, and splashing of spores by rain has been well worked out by Dimock. Control by treating cuttings, mulching to prevent splashing of spores, and by spraying lower portions of plant.

b. Foliar nematodes -- How this was controlled by foliar sprays with parathion. This is probably the first instance of a nematode disease being controlled successfully by spraying. Symptoms and life history.

c. Verticillium wilt -- This disease, until less than 10 years ago, was most serious disease of mums under glass but it is now more of a curiosity because of the use of cultured cuttings. Makes a very interesting story first with Dimock's suggestion of culturing cuttings as a method of indexing and how this was applied successfully by a plant pathologist, C. J. Olson, working for a commercial concern specializing in the production of chrysanthemum cuttings.

102. Fungus Diseases of Gladiolus. (W. D. McClellan)

a. Botrytis leaf spot and corm rot -- symptoms of this disease. How its development and occurrence closely coincides with temperature and humidity conditions. How the corm rotting phase in storage has been controlled by high-temperature curing immediately after digging. Control of the foliage phase by spraying.

b. Curvularia leaf spot -- how this disease is favored by high temperatures and humidity. History of disease. Suddenly appeared in Florida in 1947, and now a serious threat in all southern growing areas. Limited in other areas because of temperature relations. Controlled by dithiocarbamates.

c. Fusarium -- disease known as a corm rot, then yellows. Prior to 1940 Picardy was resistant and now known as the "Picardy disease" in Florida. $2,000,000 loss in Florida alone last year. Control, corm treatments (preplant, after harvest, and prestorage), resistance, fertilizer relationships to disease severity, disease-free corms - mother block system.

103. The Botrytis Disease of Lilies and Tulips. (C. J. Gould)

Botrytis elliptica affects many Easter and garden lilies. Scorch (physiological) often confused with Botrytis. Symptoms, life history, and control of these diseases. Effect of temperature and humidity on the development of these diseases.

104. Nematode Diseases of Bulbs. (W. D. Courtney)

Bulb and stem nematode. Discussion of strains, host range, life history, and control. Story of development of hot water treatment of narcissus bulbs because of quarantine restrictions.

Lily nematode. Problem in Northwest and how it was controlled.

105. Fusarium Basal Rot of Narcissus. (W. D. McClellan)

This disease is serious in bulb-growing areas in the East and not along the Pacific Coast because of differences in soil temperatures. Hot water treatments were developed for the control of bulb nematodes but this spread Fusarium. As a result formaldehyde was added. Control is based on post-harvest treatments with mercuries, some of which result in severe flower injury the following season.

106. Diseases of Roses. (L. M. Massey)

a. Blackspot -- This disease is the most serious disease of roses largely due to its indirect effects. The defoliation caused by this disease reduces the vigor of the plants thus making them more susceptible to winter kill, die-back, cankers, etc. Spread by splashing water. No longer a problem in green houses now that florists use aerosols for control of spider mite and therefore do not syringe. Field control.

b. Mildew -- Effect of temperature and humidity on development. Longree. Control, varietal susceptibility.

c. Rust -- Serious on West Coast and not in East due to temperature. Cochrane.
Heat in summer and cold in winter, prevent it becoming established in the East.

107. Aster Yellows. (L. O. Kunkel)

This disease has a large host range including many vegetables and weed hosts. Transmitted by a leafhopper - history of disease and its research. Symptomatology - limits production of asters and other crops in many areas.

108. Virus Diseases of Carnations. (Philip Brierley)

Symptom picture, method of transmission, when symptoms are most evident (mosaic in early spring and streak in late spring).

109. Chrysanthemum Stunt. (Philip Brierley)

This disease, unknown 1945, became so serious and alarming that the entire greenhouse production of mums was threatened. Through the efforts of pathologists, Brierley, Keller, and Olson, its nature was determined and methods of spread and now it's pretty much an unpleasant memory among greenhouse operators because of the use of indexed cuttings. It is serious, however, in hardy varieties of chrysanthemums produced out-of-doors.

110. Virus Diseases of Glads. (Philip Brierley, F. L. Smith, and F. P. McWhorter)

Mosaic common to practically all commercial glads except seedlings. Later shown to be yellow bean mosaic and therefore glads hazardous to beans. Destructive effect on Freesias. White Break and Aster Yellows.

111. Virus Diseases of Lilies, Tulips, and Narcissus. (F. P. McWhorter and Philip Brierley)

Breaking in tulips is the oldest known virus disease and infected bulbs formerly commanded premium prices. Discovery of nature of this disease, its spread, vector relations, etc. Mosaic is a common disease of lilies and is extremely hazardous to many garden types. Consequently, certain lily species should not be grown together unless known to be free of mosaic. Lily fleck due to combined action of two viruses. This disease has caused severe losses in the South and many lily growers in the area have gone out of business because of this disease. Symptoms, host, range, and control.

112. Virus Diseases of Roses. (Philip Brierley)

Largely a problem for nurserymen.

113. Effect of Diseases on Ethylene Production in Plant Tissues and its Effect on the Defoliation of Plants and on "Sleepiness" in Cut Flowers. (C. E. Williamson and A. W. Dimock)

A new and important concept insofar as commercial florists are concerned.

Part 17. Diseases of Fruits and Vegetables in Transit, Storage, and on the Market

114. Importance of Transportation, Storage, and Market Diseases. (H. T. Cook)

A discussion of the nature and actual extent of the losses; increased value of the commodity after being harvested, packed, and shipped to market; and effect of spoilage on the market.

115. Research on Transportation, Storage, and Market Diseases. (J. S. Wiant)

A brief description of the development and evoluation of transportation, storage, and market disease studies; description of present organization and cooperative nature of the investigations with shippers, transportation organizations, receivers, and others; and relation to the inspection service.

116. Some Important Post Harvest Diseases Caused by Fungi.
(G. B. Ramsey and M. A. Smith)

A discussion of about 10 or 12 of the important fungus diseases that are important in storage, transportation, and on the market and the factors that favor their development.

117. Some Important Post Harvest Diseases Caused by Bacteria.
(Wilson Smith and B. A. Friedman)

Same type of discussion as under 111.

118. Some Important Post Harvest Diseases Caused by Viruses.
(L. P. McColloch)

Same type of discussion as under 111 but for sweetpotato internal cork.

119. Low Temperature Injuries in Storage and in Transit.
(L. P. McColloch)

A discussion of the physiological low temperature breakdown of sweetpotatoes, citrus, bananas, cucumbers, and tomatoes caused by chilling injuries, and the effect of chilling temperatures on subsequent disease development. Also a discussion of freezing injury.

120. Physiological Diseases that Develop in Storage and in Transit.
(T. R. Wright)

A discussion of apple and pear scald in storage, black heart of potatoes, suboxidation of various fruits and vegetables.

121. Mechanical and Chemical Injuries that Occur in Storage and in Transit. (G. B. Ramsey)

A discussion of chemical injuries caused by chemical washes for removal of spray residue, chemical treatments for decay control, and by accidental escape of refrigerants such as SO_2 and ammonia.

122. Growing Conditions Before Harvest Influence Development of Diseases in Storage and in Transit. (H. T. Cook)

A discussion of the importance of disease control in the growing crop and the effect of maturity, vitality of the plants, variety and weather conditions on the keeping quality and development of post-harvest diseases.

123. Careful Handling to Avoid Cuts and Bruises Reduces Spoilage. (T. R. Wright)

The relation of injuries to infection and development of spoilage of various fruits and vegetables will be discussed.

124. Chemical Treatments Reduce Spoilage in Storage and in Transit. (J. R. Winston and H. B. Johnson)

The use of disinfectant washes, sprays, and wax emulsions of various kinds to reduce decay of apples, pears, potatoes, citrus, and other fruits and vegetables will be described. Also there will be a discussion of the use of oil-treated fruit wraps for the control of apple and pear scald; copper wraps for pear gray mold, and diphenyl wraps and box liners for citrus stem end rot and penicillium mold.

125. Fumigants Control Some Diseases. (W. T. Pentzer)

The use of SO_2 fumigation for control of Botrytis rot of grapes, and $N Cl_2$ for control of citrus and cantaloup decays will be discussed.

126. The Use of Low and High Temperatures to Control Disease. (J. S. Wiant)

The effect of various temperatures on growth of fungi and bacteria in culture and development of decay will be described. The methods of applying refrigeration such as precooling in storage rooms, tunnels, refrigerator cars and by vacuum, and the different protective services provided by the railroads will be discussed. Special refrigeration requirements for certain commodities will be described. The use of high temperatures in the pasteurization treatment for black rot of sweetpotatoes and hot water treatment for brown rot of citrus will be described.

Part 18. Diseases of Tree Fruits (exclusive of citrus)

127. Introduction. (J. C. Dunegan)

General resume of the subject, with an enumeration of the important diseases, losses, and principal control measures, concluding with incidental references to some of the minor diseases.

128. Apple Scab. (G. W. Keitt)

129. Apple Blotch and Bitter Rot. (J. C. Dunegan)

130. Apple Rust. (J. M. Hamilton)

131. Sooty Blotch and Fly Speck. (A. B. Groves)

132. Apple Mildew. (Roderick Sprague)

133. Fungus Diseases of Pear. (J. Kienholz)

Includes scab, stony pit, leaf spot and blight.

134. Pear Blight. (C. Emlen Scott)

135. Peach Brown Rot and Scab. (J. C. Dunegan)

136. Bacterial Spot of Peaches. (J. C. Dunegan)

137. Peach Anthracnose. (D. H. Peterson)

138. Cherry Leaf Spot. (Fred H. Lewis)

139. Apricot Brown Rot. (E. E. Wilson)

140. Bacterial Canker and Coryneum Blight of Stone Fruits. (E. E. Wilson)

141. Root Rots of Tree Fruits in the West. (Stephen Wilhelm, Neil Allan MacLean, and H. Earl Thomas)

142. Root Rots of Tree Fruits in the East. (C. N. Clayton)

143. Crown Gall and Hairy Root. (A. J. Riker)

144. Virus Diseases of Stone Fruits. (L. C. Cochrane)

A discussion of the virus disease complex in the stone fruits and their interrelationships. Methods of spread, wild hosts, symptoms, and control measures will be discussed.

Part 19. Diseases of Small Fruits

145. Cranberry Diseases. (H. F. Bergman)

An interesting story can be prepared on economic importance, work done during the past 50 years, early investigators, effects of weather and bog conditions, causative organisms involved, variable in different sections, probably systemic infection of some, relation of method of harvesting to prevalence, control by using bordeaux and ferbam and spray and sorting machinery.

Shear's early theory as to cause of false blossom disease, Dobroscky proved virus nature and determined vector, neither disease or vector on Pacific Coast, method and rate of spread in different cranberry sections, symptoms, varietal resistance, and breeding program.

Damage caused by oxygen deficiency in flooding water due to ice and snow cover, effects on vines, physical and biological factors involved, experiments on producing oxygen deficiency artificially, simple method of determining oxygen content of flood water and suggestions for preventing flooding injury.

146. Blueberry Diseases. (J. B. Demaree)

Stunt, a virus disease, geographic distribution, economic importance, history, symptoms, and vectors. Stem canker, known distribution, description, damage done, and varietal resistance. Several foliage diseases causing considerable damage, especially in the South, can be discussed. Life history of the Mummyberry fungus, damage done by the two spore forms, effect of weather conditions on the development of apothecia; tip, and berry infection and control measures will be described.

147. Diseases of Grape. (A. J. Braun and E. S. Luttrell)

148. Pierce's Disease and Other Virus Diseases of Grape in the West. (W. B. Hewitt)

149. Diseases of Raspberry and Blackberry in the East. (J. B. Demaree)

Virus diseases: About 30 years ago before too much was known about virus diseases of raspberries, the industry in the East reached a low ebb. Due to studies made by pathologists in Michigan, New York, and Ohio during the 1930's, the situation is now well in hand for all types except mild streak. Other viruses to be treated are red and yellow mosaic, curl, and severe streak.

150. -- Continued

Fungus diseases: Over a dozen fungi attack raspberry and blackberry and will be discussed and described under suitable headings.

151. Diseases of Raspberry and Blackberry in the West. (Folke Johnson)

Diseases of these two crops are somewhat different in the West and should be handled by a pathologist on the Pacific Coast.

152. Strawberry Root and Foliage Diseases. (J. B. Demaree)

153. Strawberry Virus Disease in the United States. (J. B. Demaree, C. P. Marcus, Jr., and H. E. Thomas)

Part 20. Diseases of Tropical and Subtropical Fruits

154. Avocado Diseases. (George Zentmeyer)

Avocado root rot will be described and methods for controlling it discussed. Other diseases of avocado and their control will be described briefly.

155. Banana Diseases. (J. C. Dunegan)

The Panama disease (Fusarium) and its importance will be discussed as well as the problems involved in its control. The foliage diseases of banana will also be discussed.

158. Brown Rot Gummosis and Other Fungus Diseases of Citrus. (J. F. L. Childs)

The importance of brown rot gummosis, its history and control, including the use of sour root stocks and the subsequent involvement of these in the quick decline picture. Anthracnose.

157. Quick Decline or Tristeza and Other Virus Diseases of Citrus. (Ted Grant and L. J. Klotz)

This disease is of worldwide importance. The rapid spread of this disease in California has alarmed citrus growers there where serious losses have occurred. The story of the cooperation by Federal, State, and foreign pathologists in attempting to solve the problem created by this disease is probably unique. The host range, vectors, and symptoms will be discussed. Other virus diseases of citrus will be discussed briefly.

158. Diseases of Coconuts. (Otto A. Reinking)

Kadang-Kadang Disease -- This serious disease threatens the coconut (Copra) industry in the Philippines. Also disease in Bahamas.

159. Fruit Spoilage Diseases of Fig. (H. N. Hansen)

The control of a fruit spoilage disease through the use of a method of indexing caprifigs is a very interesting story and illustrates a method whereby practical control is obtained.

160. Diseases of Pineapples. (M. B. Linford)

Nuts

161. Almond Diseases. (E. E. Wilson)

Brown rot and possibly other diseases.

162. Pecan Diseases. (John R. Cole)

Scab and rosette, a physiological disease of pecans.

163. Diseases of Walnuts and Filberts. (Paul W. Miller)

Bacteriosis of walnuts and filberts, blackline and boron deficiency will be discussed. Brooming disease should be noted.

Part 21. Diseases of Forest and Shade Trees

164. Diseases of American Forest and Shade Trees. (L. M. Hutchins)

A review of the importance, nature and control of the more important diseases of American forest and shade trees. The special danger of introducing new forest diseases will be explained.

165. Aerial Surveys for Forest Tree Diseases. (M. E. Fowler)

166. Oak Wilt. (T. W. Bretz)

Appendix

Glossary

Tables